



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,800	01/24/2004	Larry S. Eoff	2003-IP-009464U1	1654
71407	7590	01/28/2009		
ROBERT A. KENT P.O. BOX 1431 DUNCAN, OK 73536			EXAMINER FIGUEROA, JOHN J	
			ART UNIT 1796	PAPER NUMBER
			NOTIFICATION DATE 01/28/2009	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ROBERT.KENT1@HALLIBURTON.COM  
Tammy.Knight@Halliburton.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/763,800	<b>Applicant(s)</b> EOFF ET AL.	
	<b>Examiner</b> John J. Figueroa	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) See Continuation Sheet is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,10-14,21,24-29,127,130-132,137-141,144,145 and 147 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                                    |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                               | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/03/2008</u> . | 6) <input type="checkbox"/> Other: _____                                                |

Continuation of Disposition of Claims: Claims pending in the application are 1,3-5,10-14,21,24-29, 100-106; 111-127, 130-145, 147, 149-151 and 155-157.

Continuation of Disposition of Claims: Claims withdrawn from consideration are 100-106,111-126,133-136,142,143,149-151 and 155-157.

## **DETAILED ACTION**

### ***Response to Amendment***

1. The 35 U.S.C. 112, first and second paragraph, rejections that were previously made of record in items 7 and 9 on pages 3 and 4, respectively, of the Office Action dated July 17, 2008 (hereinafter 'OA') have been withdrawn.
2. The 35 U.S.C. 102(e) rejection of claims 1, 3-5, 10-14, 21, 24-29, 127, 130-132, 137-141, 144, 145 and 147 as anticipated by PCT Application Publication WO 03/056130 A1 to Couillet et al. (hereinafter 'Couillet') previously made of record in item 11 on page 5 of OA has been withdrawn in view of Applicant's amendment to the claims in the response to OA filed October 17, 2008 (hereinafter 'Response') as discussed below in the instant action.
3. The 35 U.S.C. 102(b) rejection of claims 127, 130-132, 137-141, 144, 145 and 147 as anticipated by U.S. Patent Application Publication No. 2003/0013871 A1 to Mallon et al. (hereinafter 'Mallon') previously made of record in item 12 on page 7 of OA has been withdrawn in view of Applicant's amendment to the claims in Response as discussed below in the instant action.
4. The 35 U.S.C. 103(a) rejection of claims 1, 3-5, 10-14, 21 and 24-29 as unpatentable over Mallon in view of Couillet that was previously made of record in item 14 on page 8 of OA has been withdrawn.

***Election/Restrictions***

5. A restriction requirement and an election of species had been previously presented in item 1 on page 2 of the Office Action of March 23, 2006 and in item 3 on page 2 of Office Action of March 5, 2007.

6. Applicant had elected Group I, claims 1-5, 10-14, 21, 24-29 and 99-149 which were drawn to a method of performing an injection operation including introducing a relative permeability modifier (RPM) comprising a hydrophobically modified water-soluble polymer, classified in class 507, subclass 110.

7. An election of species for the hydrophilic polymer was required (items 7-8 of the Office Action of 3/23/2006) and Applicant had elected, without traverse, "chitosan" as the species to be examined.

Accordingly, claims 100-106, 111-126, 133-136, 142,143, 149-151 and 155-157 have been withdrawn from consideration in the instant action as drawn to a non-elected species.

***Claim Rejections - 35 USC § 103***

**8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.**

9. Claims 1, 3-5, 10-14, 21, 24-29, 127, 130-132, 137-141, 144, 145 and 147 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 3,335,794 to Bond (hereinafter 'Bond') **or** USPN 5,711,376 to Sydansk (hereinafter 'Sydansk'), either in view of Couillet.

Bond discloses a secondary recovery process for recovering oil from a subterranean formation by first injecting a fracturing fluid via an injection well to said formation at a pressure that forms formation fractures; adding a surfactant and a "slug" of an aqueous fluid" in about an equal amount to the injected fracturing fluid to displace the fracturing fluid to a distance between the injection well and a production well; and adding a "driving fluid" (diverting fluid) that can be aqueous water or brine to displace the fluids from the vicinity of the injection well to a second zone encompassing the production well. (Col. 1, lines 10-24; col. 4, line 49 to col. 5, line 26; col. 5, lines 36-55; Example in col. 6, lines 13-48; claims 1, 3 and 11)

Similarly, Sydansk discloses a process for enhancing oil recovery, wherein the process includes fracturing a subterranean formation in communication with a producing well, wherein the process comprises injecting into said formation via a well an aqueous foamed fracturing fluid comprising a polymer at a pressure sufficient to induce formation fractures; wherein the foam gas "energizes" the fluid and (when the pressure is decreased by, e.g., producing fluids) the gas expands and drives much of the liquid component of the fracturing fluid out of the fracture and to any zone of an adjacent formation that the fluid has penetrated (such as a producing well). (Abstract; col. 2, lines 9-24; col. 4, line 33; col. 6, lines 37-48; col. 8, lines 40-51)

However, neither Bond nor Sydansk disclose their respective fracturing fluid to comprise a hydrophobically-modified chitosan compound.

On the other hand, Couillet teaches a method for fracturing/treating a subterranean formation to substantially alter the fluid flow (permeability) and/or surface

characteristics of the formation, said method including injecting into the formation an aqueous fracturing viscoelastic composition containing a water-soluble hydrophobically-modified polymer having hydrophobic chains of approximately 12-24 carbons and a molecular weight between 10,000 and 10,000,000 g/mol. (Abstract; page 1, lines 1-24; page. 4, line 10 to page 5. line 22; page 8, lines 26-32; page 11, line 28 to page 12, line 19; page 13, lines 5-9; page 19, lines 18-32; See, e.g., Examples 12-14 disclosing studies of the leak properties (fluid-loss permeability) of sample drilling fluids)

Couillet further teaches that the polymer backbone can be a polysaccharide or a derivative thereof, such as chitin or chitosan, having a molecular weight around 100,000 to 500,000 g/mol; wherein the chitosan can be modified via an acylation reaction (i.e. formed by an alkylation reaction of a chitosan hydrophilic backbone involving an alkali halide, such as an alkyl chloride). (Page 12, line 21 to page 13, line 31; See Example 10 and Figures 15-16 disclosing a drilling fluid comprising from about 1 to 10% modified chitosan having an 11-carbon hydrophobic side chain)

Examiner notes that Couillet teaches chitin, chitosan and modified chitosan via acylation/alkylation with an alkyl halide as a polymer compound added to the formation. (See, instant claims 5 and 6 reciting chitosan and alkyl halide as the hydrophilic polymer and hydrophobic compound, respectively.) Consequently, Couillet is disclosing using in the method of treating a formation a RPM polymer compound as encompassed by the instant claims with "sufficient specificity".

Moreover, Couillet teaches that this viscoelastic-surfactant based fracturing fluid imparts a minimal pressure drop in the pipe within the wellbore during displacement;

Art Unit: 1796

has a minimal leak-off rate to avoid fluid migration into the formation rocks that may prevent produced hydrocarbons to flow into the wellbore; has a relatively low friction pressure; and is "responsive" in that it degrades to a low viscosity fluid when in contact with produced formation fluids during backflow from the reservoir to the wellbore.

Therefore, it would have been obvious to one in the art at the time that the claimed invention was made to use the fracturing fluid taught in Couillet that comprises a hydrophobically-modified chitosan compound as the fracturing fluid component in the injection treatment processes disclosed in Sydansk or Bond. It would have been obvious to one skilled in the art to do so because this fracturing fluid would impart enhanced properties to the resultant processes, such as minimal pressure drop in the pipe during displacement; minimal leak-off rate to avoid fluid migration into the formation rocks to prevent produced fluid loss; relatively low friction pressure; and be "responsive" to produced formation fluids, as taught by Couillet.

Although Couillet may not expressly disclose "diverting at least a portion of the aqueous injection fluid to another subterranean zone" as recited in independent claim 1, Couillet teaches treating a formation with the same relative permeability modifier (RPM) polymer compound as encompassed by the instant claims and thereby should possess the same physical properties/effects. Accordingly, the RPM used in the method disclosed in Couillet should "divert" a portion of the fluid to another surface of the subterranean formation upon the addition of said RPM polymer compound in Couillet's method of treating/fracturing a formation because said RPM disclosed in Couillet is encompassed by that recited in the instant claims.



Thus, the claims are unpatentable over Bond or Sydansk, either in view of Couillet.

### ***Response to Arguments***

#### ***The 35 U.S.C. §112 Rejections (item 7 and 9 of OA)***

10. Applicant's arguments in Response with respect to the captioned 35 U.S.C. 112 rejections have been considered and deemed persuasive in view of Applicant's showing of written description support for the alleged new matter in paragraph [0023] of the specification. Accordingly, these rejections have been withdrawn.

#### ***The 35 U.S.C. §102 and 103 Rejections over Couillet and Mallon (items 11, 12 and 14 of OA)***

11. Applicant's arguments in Response with respect to the captioned prior art rejections over Couillet and/or Mallon have been considered but deemed moot in view of the withdrawal of this rejection in favor of the new grounds of rejection presented above in the instant action. These rejections have been withdrawn because neither Couillet nor Mallon disclose a subterranean formation process wherein the treatment fluid comprises a water-soluble hydrophobically-modified polymer (chitosan) that is added via an injection well, wherein said polymer subsequently diverts a first fluid from a first zone to a second zone upon an injection of a second aqueous fluid, and, particularly, wherein the subterranean formation further includes a production well.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John J. Figueroa whose telephone number is (571)272-8916. The examiner can normally be reached on Monday-Thursday 8:00-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone

Art Unit: 1796

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JJF/RPG

/Randy Gulakowski/  
Supervisory Patent Examiner, Art Unit 1796